REGIONAL PREHISTORY AND CALIFORNIA-GREAT BASIN INTERACTION: AN ASSESSMENT OF RECENT ARCHAEOLOGICAL STUDIES IN THE NORTHERN SIERRA NEVADA

Richard E. Markley and Donna A. Day
Tahoe National Forest
P.O. Box 6003
Nevada City, CA 95959

ABSTRACT

This paper evaluates the results of a number of recent archaeological investigations conducted in the northern Sierra Nevada region, with particular emphasis on their contributions to our understanding of California-Great Basin interaction in prehistory. Particular emphasis is placed on an examination of the growing body of obsidian sourcing and hydration data from excavated sites in the region. Analysis of these data indicates that aboriginal populations obtained obsidian in varying frequencies from a variety sources, with a handful of sources most dominant. Variation in frequency was found to be strongly related to the geographic location of sites in relation to source areas. Changes through time in the relative frequency of obsidian from certain sources were documented, and several obsidian exchange networks are postulated.

INTRODUCTION

Though archaeological studies have focused on the northern Sierra Nevada region for nearly 40 years, achieving an understanding of the prehistory of the region has proven to be a difficult task. Many of the original questions regarding the origin and development of prehistoric cultures in this area are only slightly better understood than they were in the 1950s. Positioned at the interface between California and the Great Basin, the cultures in the northern Sierra Nevada region (Figure 1) undoubtedly participated in, and to varying degrees controlled, prehistoric interactions between California and the Great Basin. The study of these prehistoric cultures would seem, therefore, to be critical for an understanding of the dynamics of cultural interaction and change over a broad area of the west.

The lack of headway in northern Sierra Nevada archaeology is a commentary on the archaeology of the region itself, and the particular difficulty with which archaeological understanding is achieved when temporal control is difficult to obtain, where mixed assemblages are common, where stratigraphy is unheard of,

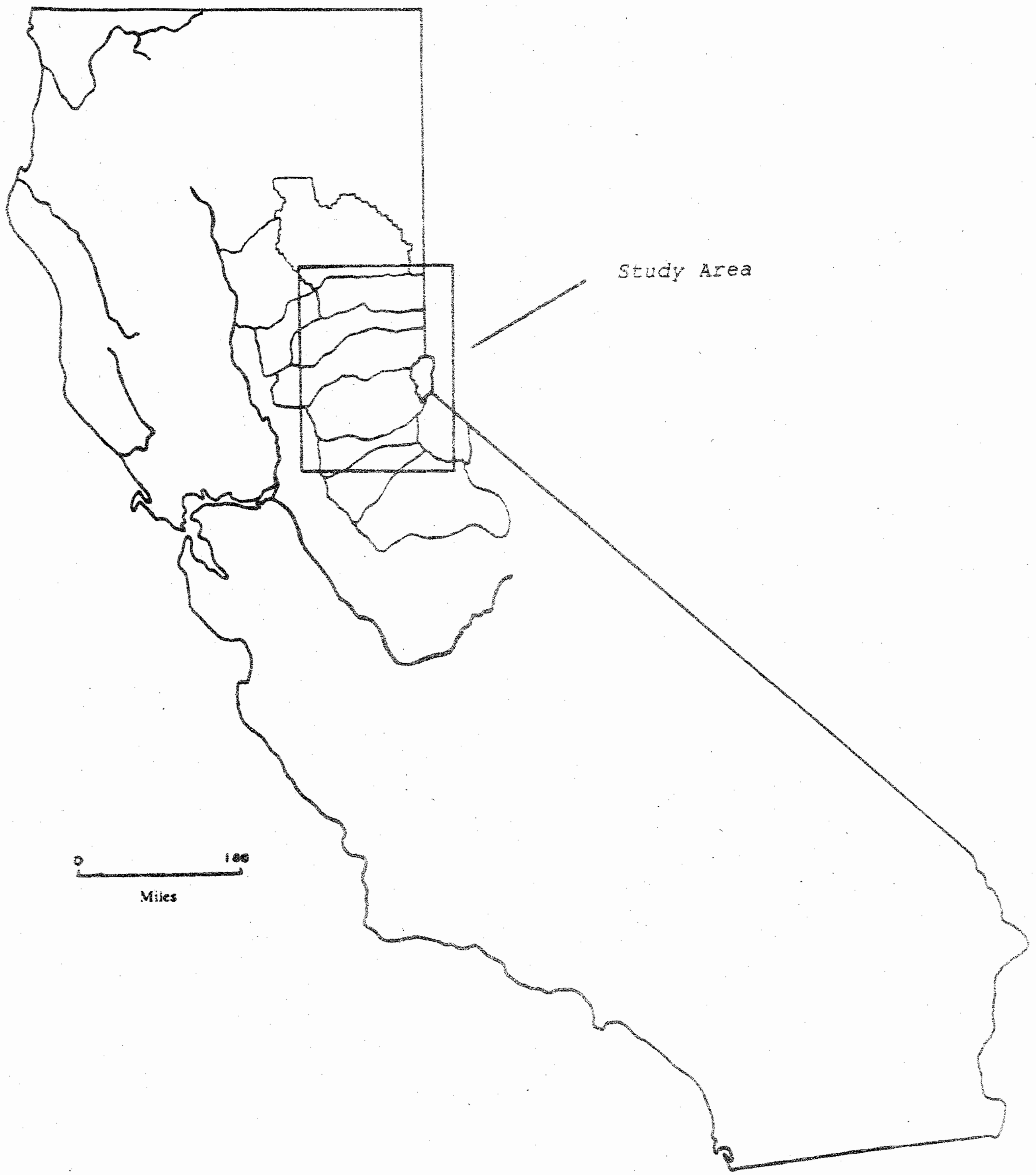

Figure 1. Map of study area.

and where obsidian for dating is in short supply. When coupled with indications of extensive and frequent population movements and interactions (cf., Kowta 1988; Levy 1979; Moratto 1984; Whistler 1977) and a perplexing and seemingly inconsistent isolationism noted by Bennyhoff et al. (1982:185), northern Sierra Nevada prehistory presents a difficult challenge at best.

Despite these realities, the decade of the 1980s saw a number of significant archaeological studies which focused on the northern Sierra Nevada and which produced some dents, if not cracks, in the region's protective armor. A common feature of many of these studies was an effort to extract as much information as possible from the analysis of obsidian artifacts and debitage. While these items occur as small components of otherwise large lithic assemblages, sourcing and hydration studies of them may yet prove to be a key in breaking the standstill in northern Sierra Nevada archaeology.

RESEARCH DESIGN

Our research involved the analysis of obsidian data from a sample of 559 artifacts obtained from excavations of 28 archaeological sites in the northern Sierra Nevada (Table 1, Figure 2).

The analysis was directed towards a number of questions concerning the development of aboriginal cultures in the northern Sierra Nevada and the role of these cultures in prehistoric exchange between California and the Great Basin. For example, there are several competing and complex interpretations of northern Sierra Nevada prehistory that have taken us well beyond the initial hypotheses of Elsasser (1960).

The models of Elston (1971), Elston et al. (1977), Moratto (1984), and Kowta (1988) postulate a variety of population movements, expansions, contractions, and intrusions throughout prehistory, and it may be expected that the nature and extent of these changes should have affected prehistoric exchange systems, including the exchange and distribution of obsidian. Obsidian was obviously not the only commodity exchanged, but because it can be chemically linked to its source, it can serve as a tracer to illuminate broader exchange patterns. There are no intensively exploited obsidian sources in the region, so obsidian had to be obtained through trade. The generally low frequency of obsidian in the northern Sierra Nevada indicates, however, that it was not a primary trade item.

Previous studies by Jackson (1974), Jack (1976), and Ericson (1977), have identified broad patterns of obsidian exchange in California and the Great Basin. Several of these studies have, on the basis of limited data, discussed the nature of obsidian use and exchange in the northern Sierra Nevada specifically, including changes and trends through time. We were interested to

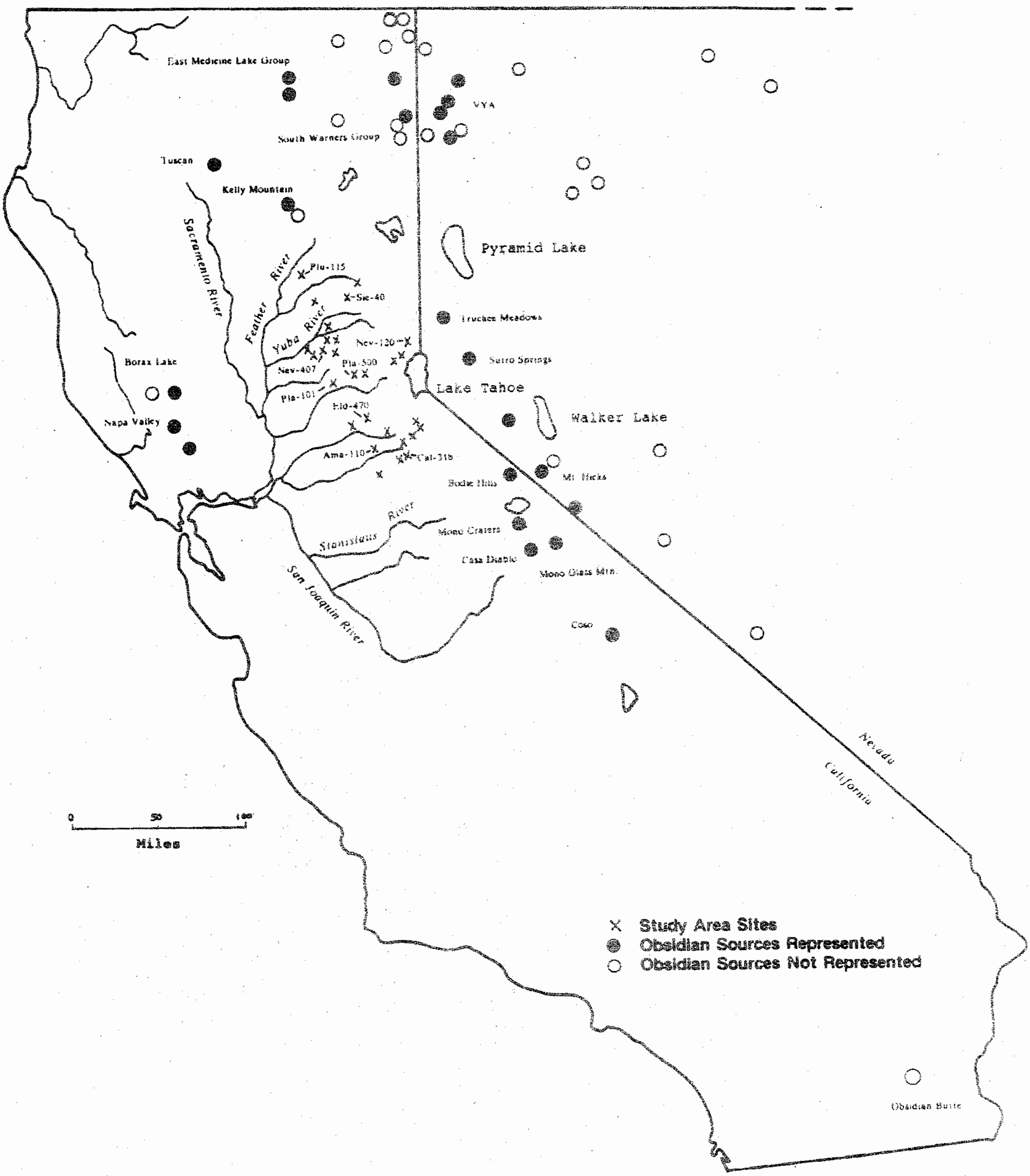

Figure 2. Obsidian sources and study area sites.

Table 1. Archaeological sites included in study.

Archaeological Site	Reference
ALP-193, -194	Bennyhoff et al. (1982)
AMA-110, -235	Wirth Environmental Services (1985)
AMA-269, -270	Bennyhoff et al. (1982)
CAL-318	Wirth Environmental Services (1985)
CAL-991	White (1988)
ELD-405, -470	Lindstrom (1982)
ELD-458	Bennyhoff et al. (1982)
NEV-120	Peak and Associates (1988)
NEV-194	Ancient Enterprises (1984a)
NEV-407	Ancient Enterprises (1984b)
NEV-199	Rondeau (1982)
NEV-203, -251	White and Origer (1987)
NEV-318	Farber (1982)
NEV-356	Payen (1987), Wheeler (1987)
NEV-529	Lindstrom (1990)
PLA-101	Ritter (1971), Jackson (1974)
PLA-500	Wohlgemuth (1984)
PLA-664	Waechter (1989)
PLU-115	Peak and Associates (1983)
PLU-237	Chuck James (personal communication 1990)
SIE-411	Quinn and Origer (1988)
SIE-40	Chuck James (personal communication 1990)
FS-05-17-53-475	Waechter (1990)

see how the growing body of obsidian sourcing and hydration data squared with the conclusions derived from earlier analyses.

For example, the early work of Tom Jackson (1974:64) suggested that in the northern Sierra Nevada there was an economic shift late in time in which there was an increase in the importation of Napa Valley obsidian and a reduction in the occurrence of Bodie Hills obsidian. Jackson's observations were based on an admittedly small sample, and we were interested to see if this trend was apparent in the larger sample of site data we now have available.

Bennyhoff et al. (1982:183), working in the high Sierra to the south of Lake Tahoe, suggested that additional studies may show evidence of the increasing importance of a north-south trade route along the eastern Sierra Nevada. We hoped that examination of the obsidian data base would clarify the nature and extent of this hypothesized system or systems.

Those are a few of the more complex areas we hoped to investigate, but actually our research began with much simpler questions designed to guide us towards a clearer and more basic understanding of the use and exchange of obsidian in the region. For example, we were interested in ascertaining the frequency of obsidian in lithic assemblages as a measure of the extent to which aboriginal populations appear to have participated in obsidian exchange networks. We were also interested in determining to what extent simple distance or direction to source was a factor in determining the frequency of obsidian from various sources.

Finally, we were interested in making temporal distinctions among the obsidian data, and wanted to explore the multitude of hydration rates in the literature to see which were most applicable and consistent with the known chronology for the region.

DATA ANALYSIS

The sites in our study ranged from Plumas County in the north, to Calaveras County in the south (Figure 2). As Table 2 shows, many of the known obsidian sources in California and Nevada are represented in the 28 sites we studied. While 21 known sources are represented, the bulk of obsidian comes from 7 main sources: Bodie Hills, Napa Valley, Borax Lake, East Medicine Lake Group, Mt. Hicks, South Warners Group, and Massacre Lake/Guano Valley Group (Vya) (Table 3).

Table 2. Obsidian sources in southern Oregon, western Nevada and California.

Sources in Study Area	Sources Not in Study Area
Sugar Hill Group	Buck Mountain Group
South Warners Group	Blue Spring Group
Grasshopper Flat/Lost Iron Well Group	Harris Flat Group
East Medicine Lake Group	Rainbow Mines Group
Cougar Butte Group	Del Prat Group
Tuscan Group (Source X)	Glass Mtn. Group
Kelly Mtn. Group	Callahan Obsid. Flow Group
Massacre Lake/Guano Valley Group (Vya)	Railroad Group
Bordwell Spring Group (Homecamp A)	E. Glass Mtn. Group
Pinto Peak Group (Homecamp B)	Cowhead Lake Group
Borax Lake	Blue Mtn. Group
Napa Valley	Chalk Springs Jct. Group
Anadel	Mosquito Lake Group
Sutro Springs/AH Mtn.	Badger Creek Group
Truckee Meadows	Mt. Konocti
Bodie Hills/Pine Grove	Fish Springs
Mt. Hicks	Jawbone Canyon
Queen/Hawthorne	Obsidian Butte (Imperial Valley)
Mono Crater/Mono Glass Mtn.	
Casa Diablo	
Coso Volcanic Field	

TABLE 3. Percent of obsidian on N. Sierra Nevada sites by source (sites listed north to south).

SITE	SH	CB	EML	GF	V	SW/W	B/A	PP/B	T/X	KM	BL	Ana	NV	Tke	SS	BH/PG	MH	Q	MC/MGM	CD	C	Unk
Plu-115	0	0	18	12	16	4	0	0	14	0	12	0	0	0	0	8	8	0	2	0	0	4
Plu-237	0	10	0	0	0	60	20	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0
Sie-411	0	0	55	0	0	5	0	0	0	0	0	0	0	0	0	30	0	0	0	10	0	0
Sie- 40	14	0	0	14	0	43	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
17-53-475	0	0	0	10	0	25	40	0	0	5	0	0	10	0	0	0	0	0	0	0	0	10
Nev-356	0	0	0	0	0	0	6	6	0	0	12	0	19	0	0	12	12	0	0	0	0	32
Nev-251	0	0	0	0	0	6	6	0	0	0	17	0	53	0	6	6	6	0	0	0	0	0
Nev-203	0	0	0	0	0	8	0	15	0	0	23	0	46	0	0	8	0	0	0	0	0	0
Nev-120	0	0	7	0	0	3	7	0	0	0	0	0	3	0	0	48	31	0	0	0	0	0
Nev-199	0	0	0	0	22	0	0	0	0	0	0	0	0	3	0	53	8	0	0	11	0	14
Nev-529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	7	0	7	0	33
Nev-194	0	0	0	0	21	0	0	0	0	0	10	0	53	0	0	16	0	0	0	0	0	0
Nev-318	0	0	0	0	0	0	0	0	0	* 80	0	0	0	0	0	20	0	0	0	0	0	0
Nev-407	0	0	3	1	0	13	0	0	0	0	14	0	25	0	0	21	3	1	3	0	5	15
Pla-500	0	0	0	0	0	0	0	0	0	0	6	0	6	0	0	88	0	0	0	0	0	0
Pla-664	0	0	0	0	0	0	0	0	0	0	15	0	45	0	10	20	5	0	0	0	0	5
Pla-101	0	0	0	0	0	0	0	0	0	0	7	7	26	0	0	53	7	0	0	0	0	0
Eld-458	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	66	0	0	0	0	0
Eld-470	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	5	0	0	0	5	0
Alp-192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0
Alp-193	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	0	0	0	0	0
Eld-405	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	84	6	0	0	3	0	0
Ama-269	0	0	0	0	0	0	0	0	0	* 5	0	0	0	0	0	95	0	0	0	0	0	0
Ama-270	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0
Ama-235	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0
Ama-110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0	10	0	0	0
Cal-318	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0
Cal-991	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	79	0	0	7	0	0	0

KEY:
SH-Sugar Hill Group, CB-Cougar Butte Group, EML-East Medicine Lake Group, GF-Grasshopper Flat/Lost Iron Well Group, V-Massacre Lake/Guano Valley Group (Vya), SW-South Warners Group, B/A-Bordwell Spring Group (Homecamp A), PP/B-Pinto Peak Group (Homecamp B), T/X-Tuscan Group (Source X), KM-Kelly Mtn. Group, BL-Borax Lake, Ana-Anadel, NV-Napa Valley, Tke-Truckee Meadows, SS-Sutro Springs/AH Mtn., BH/PG-Bodie Hills/Pine Grove, MH-Mt. Hicks, Q-Queen/Hawthorne, MC/MGM-Mono Crater/Mono Glass Mtn., CD-Casa Diablo, C-Coso Volcanic Field, Unk-Unknown.

* These specimens were sourced to Domingo Springs. Recent investigations have shown that the specimens which served to chemically type the Domingo Springs source may actually have come from the Napa Valley source (Greg Greenway, personnal communication 1990).

By far the greatest amount of obsidian found in northern Sierra Nevada sites comes from the Bodie Hills source. A total of 250 specimens or 44.7% of the sample is from this source. The next most common obsidian is Napa Valley with 69 specimens or 12.5% of the obsidian analyzed in the region. Borax Lake, East Medicine Lake Group, Mt. Hicks, South Warners Group, and Vya each represent about 5% of the sample. Bordwell Spring is the only other source with more than 10 specimens (N=15). Anadel, Casa Diablo, Coso, Cougar Butte, Grasshopper Flat, Domingo Springs/Kelly Mountain, Mono Crater/Glass Mountain, Pinto Peak, Queen, Sugar Hill, Sutro Springs, Truckee Meadows, and Tuscan Source X all are represented by less than 10 specimens.

When we examined these frequency data further on a site-by-site basis and calculated the distance from each site to the various obsidian sources represented at each site, we discovered that there is a correlation between site location and the relative frequencies of obsidian sources present, indicating that proximity and direction to source are key factors affecting the frequency of obsidian found at specific sites in the northern Sierra Nevada. Even though this tendency was observed by Sharon Waechter (1989), who analyzed a smaller sample of sites from within the region, we were surprised at how the location of the sites in relation to the sources appears to correlate with the observed obsidian frequencies.

Generally, obsidian found in the study area comes from 3 geographical regions - northeastern California/northwestern Nevada, hereafter referred to as "northern"; southeastern California/southwestern Nevada, hereafter referred to as "southern"; and the North Coast Ranges or "western" region. Analysis of site specific data indicated the existence of 4 relatively homogeneous, and 1 not-so-homogeneous, site groupings with respect to obsidian source frequencies.

The southernmost grouping of 11 sites in Eldorado, Amador, Alpine, and Calaveras Counties (ELD-405, ELD-458, ELD-470, ALP-192, ALP-193, AMA-110, AMA-235, AMA-269, AMA-270, CAL-318 AND CAL-991) are dominated by obsidian from the southern sources, primarily Bodie Hills. Only one site in this group has any western obsidian and there is a total absence of northern obsidian. Bodie Hills is the closest source to this site cluster, excluding Sutro Springs which was apparently a minor source throughout prehistory.

On the eastern side of the Sierra, the 5 sites in this region (NEV-120, NEV-199, NEV-529, SIE-40, and PLU-237) exhibit virtually no North Coast Range obsidian. Only 2 of the 97 specimens from these sites are from western sources. Instead, obsidian from the northern and southern sources dominate, and predictably the relative percentage of the 2 may be seen to vary according to proximity to the source area. The farther north the site is located, the higher the frequency of northern obsidian. Hypothetically, based on these data, there is a point somewhere north of NEV-120 and south of PLU-237 where obsidian from the north and south should be equally represented.

Three groupings of sites in the western Sierra Nevada further illustrate the role that distance and direction to source play. Beginning in the south, the 3 Placer County sites (PLA-101, -500, and -664) are similar in that southern obsidian dominates, but the sites are apparently far enough north and west that western obsidian begins to occur. These sites are not far enough north, however, for any northern obsidian to appear in the lithic assemblages.

Further north is another grouping of 6 sites (NEV-194, NEV-203, NEV-251, NEV-318, NEV-356, and NEV-407), all in western Nevada County, which are in the closest proximity to the western sources of all of the sites in the study, and predictably they exhibit the highest frequencies of obsidian from that region. These sites also contain obsidian from the northern and southern source regions. Except for 2 sites near Nevada City, the proportion of northern versus southern obsidian appears to vary by latitude. Overall this grouping of sites appears to be very cosmopolitan. The anomalous frequencies observed for the 2 Nevada City sites may indicate that cultural factors yet to be identified are affecting obsidian frequencies in this region.

Moving still further north, the last grouping of sites is located in Plumas and Sierra Counties (SIE-411, PLU-115, and FS-05-17-53-475). Like the western Nevada County sites, the obsidian source frequencies tend to be conditioned by geography, but there are some anomalies that stand out. As expected these sites contain mostly northern obsidian. But western obsidian is, surprisingly, relatively infrequent, and southern obsidian is unusually higher than would be expected if only geography were affecting frequencies.

The significance of what appear to be anomalies in the western Sierra Nevada from Nevada County to Plumas County is unclear. This would appear to be one area where research into the cultural influences on obsidian distribution and exchange would be productive.

It is tempting to suggest that the complex cultural historical scenarios presented by Moratto, Kowta, and others have contributed to the observed obsidian frequencies, particularly in the Nevada and Sierra County area. Or that the trade route over Donner Pass described by Sample (1950) and elaborated upon by Davis (1961) may have had some effect on the obsidian data for the area. But at this point we cannot ignore the apparently strong influence that proximity to source has on the observed obsidian source frequencies. While other cultural factors may be operating, the degree to which they are contributing to the observed distributions and frequencies, is presently unknown.

Obsidian hydration data for our sample proved not to be as useful as we had hoped due to the lack of hydration rates for most sources and multiple rates for some others. Nevertheless, when we plotted hydration rim frequencies for each of the major sources (Figures 3 to 10), we were able to make some interesting observations.

Most apparent was that hydration rim values greater than 5.0 microns were relatively rare irrespective of source. It seems clear that obsidian importation into the region accelerated dramatically at around 5.0 microns.

Using Origer's (1982) rate for Napa Valley obsidian, a 5.0 micron reading would equate to 3800 B.P. Bennyhoff et al.'s (1982) rate for Bodie Hills obsidian would put it at 2055 B.P. Friedman and Smith's (1960) rate for Bodie Hills yields a date of 3820 B.P.

Following Origer (1982) and Friedman and Smith (1960), the substantial increase in the importation of obsidian into the region would appear to coincide with the initial appearance of the Martis Complex which generally is thought to have occurred about 4000 B.P. Until hydration rates are more firmly established, however, and correlated with radiocarbon dates, the apparent correspondence between obsidian dates and hypothesized cultural events must be viewed with a great deal of caution.

Nevertheless, the obsidian data we have available to us do allow for some preliminary observations regarding culture history in the northern Sierra Nevada. To the extent that the overall obsidian frequencies reflect intensity of aboriginal use of the region, it would seem that the data support the prevalent idea that the region was lightly populated for several thousands of years prior to 4000 B.P. But by 4,000 years ago, there was a significant increase in aboriginal use of the region marked by a rise in the amount of obsidian being imported and utilized. The initial source of this increase was Bodie Hills, but soon the frequency of Napa Valley obsidian began to increase. This may suggest an initial eastern or Great Basin influence in the Sierra followed immediately by significant western or California influence. It must be remembered that the distribution of obsidian in this region appears to be controlled overall by geography, so the term "influence" may be inaccurate. Clearly, though, western Sierra populations were receiving obsidian from both Great Basin and California sources, and populations in the eastern Sierra Nevada were receiving obsidian almost exclusively from the Great Basin. This distinction, in our view, does not necessarily lend support to Farber's (1982) contention that there is not a single Martis Complex but rather a western Messilla Complex and an eastern Martis Complex. It does not cause us to reject this hypothesis either. But there are other, simpler explanations for the obsidian data (like proximity to source) that must be reckoned with.

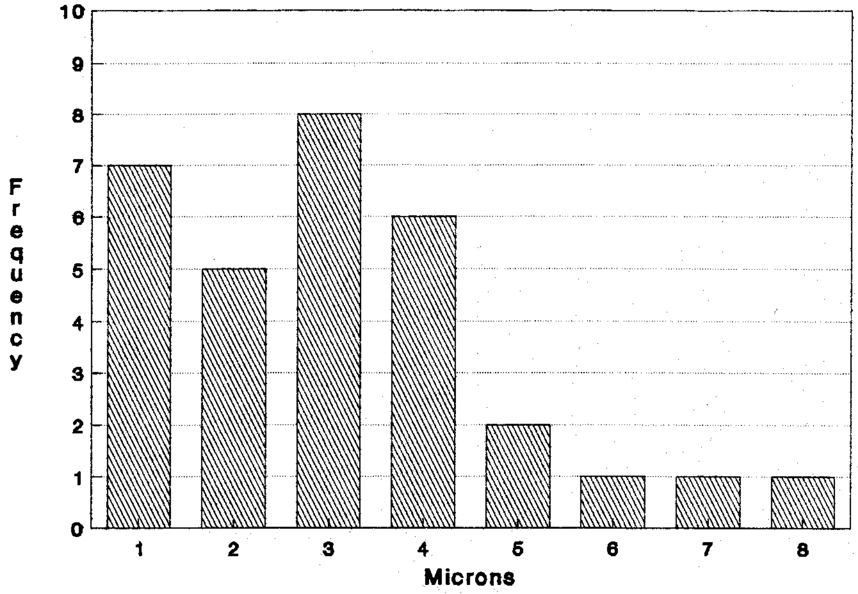

Figure 3. Borax Lake obsidian hydration rim frequencies (n=31).

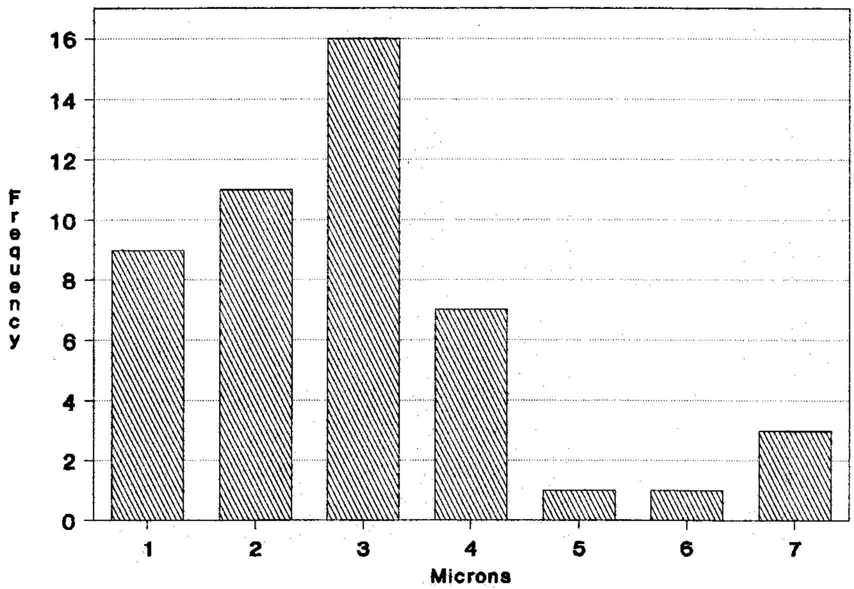

Figure 4. Napa Valley obsidian hydration rim frequencies (n=48).

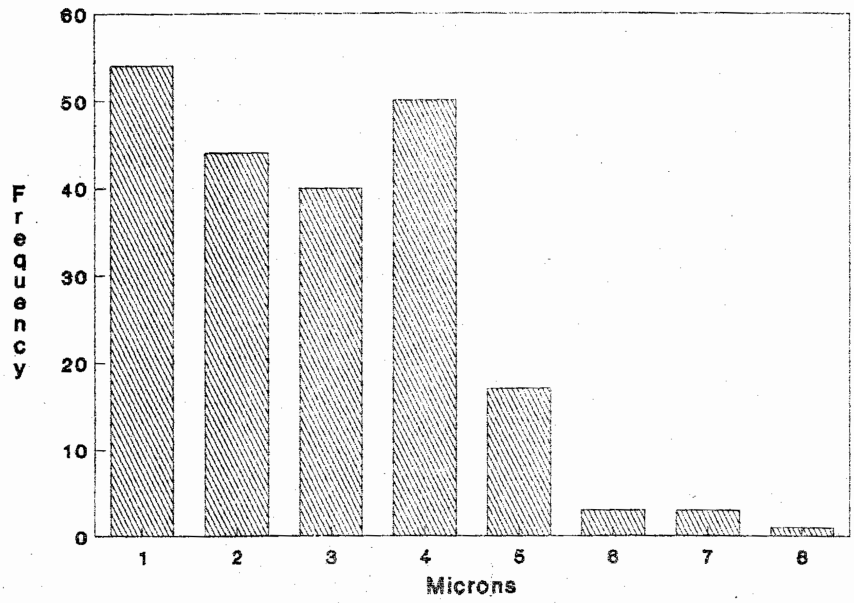

Figure 5. Bodie Hills/Pine Grove obsidian hydration rim frequencies (n=211).

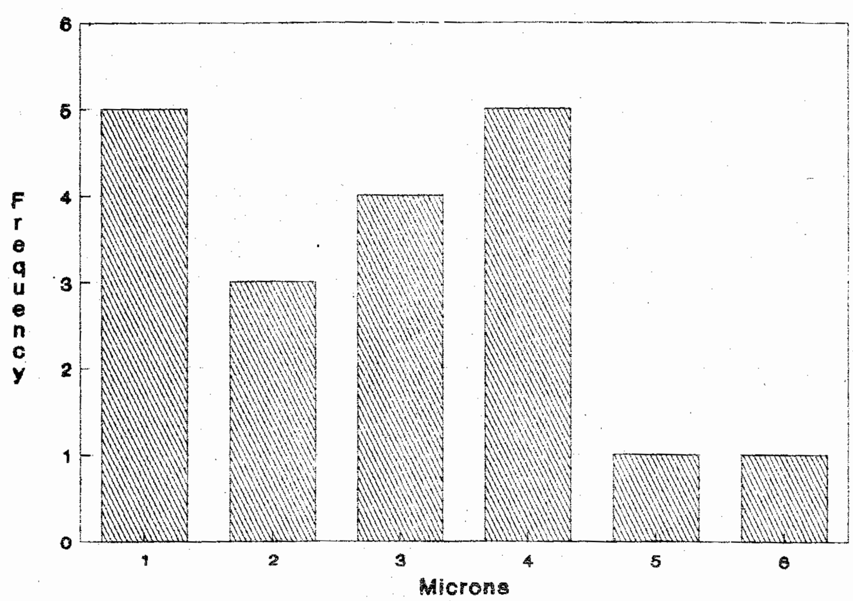

Figure 6. Mt. Hicks obsidian hydration rim frequencies (n=19).

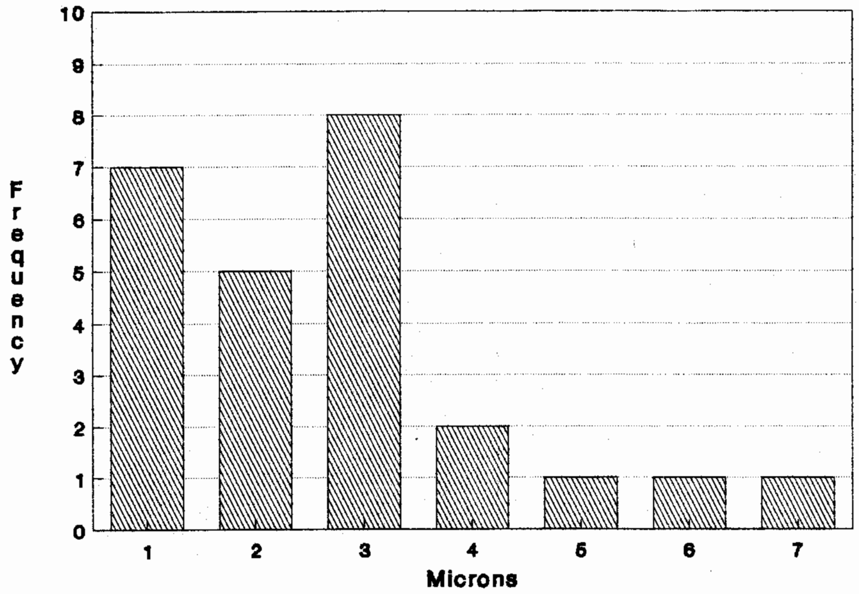

Figure 7. Vya obsidian hydration rim frequencies (n=25).

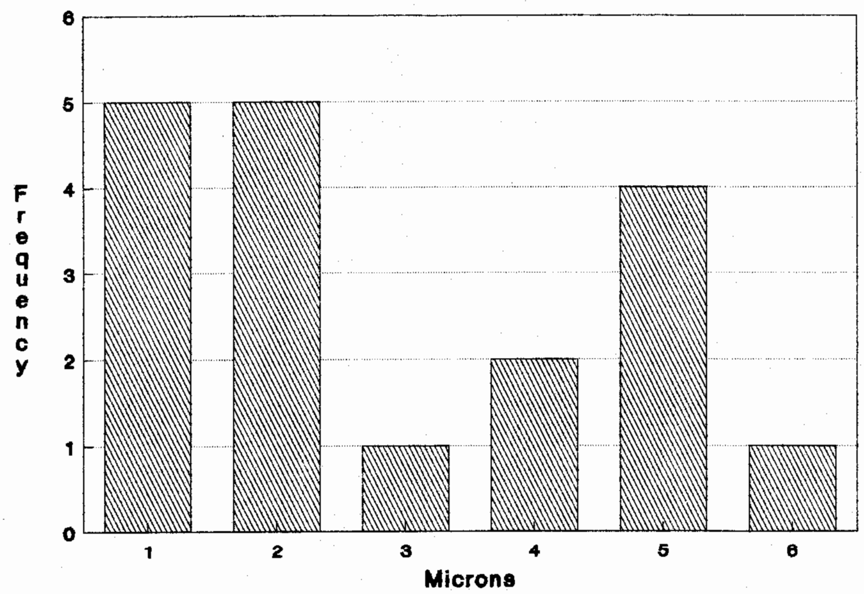

Figure 8. S. Warners Group obsidian hydration rim frequencies (n=18).

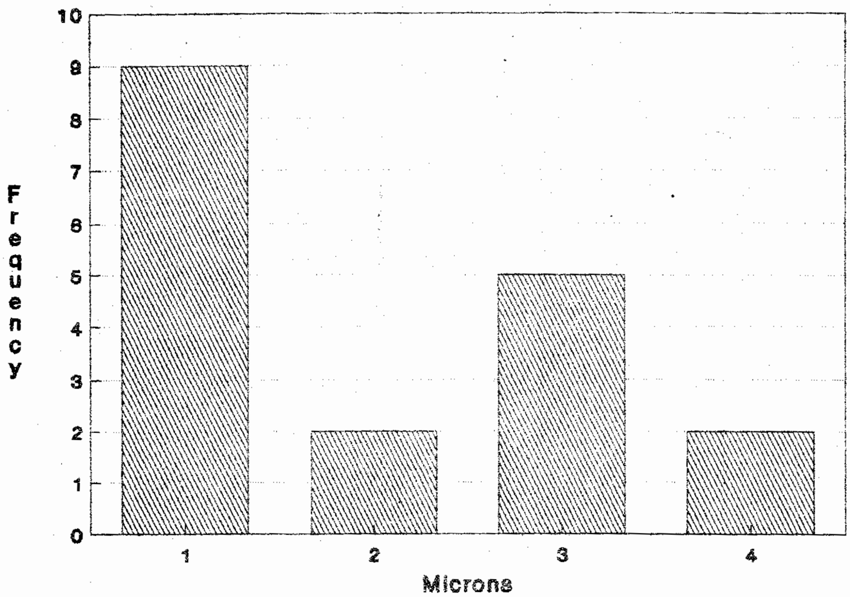

Figure 9. East Medicine Lake obsidian hydration rim frequencies (n=18).

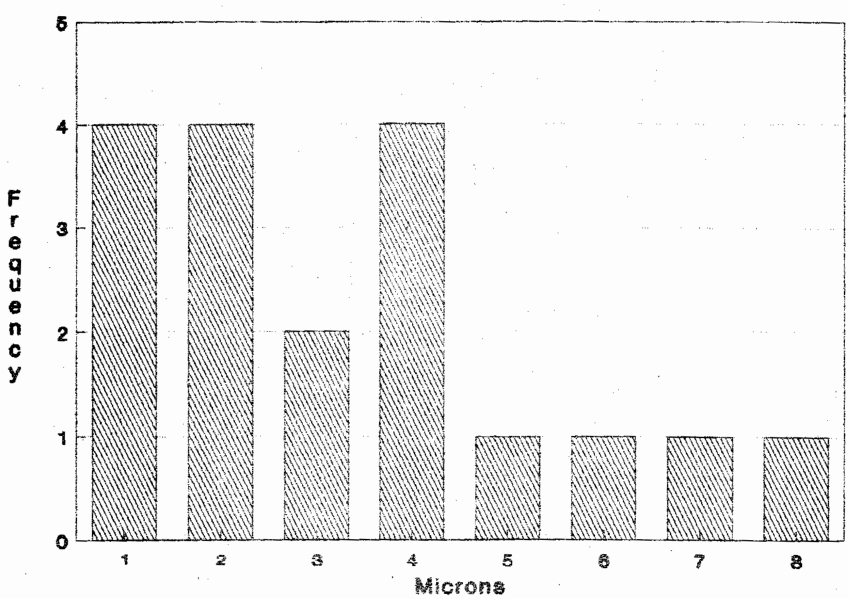

Figure 10. Obsidian hydration rim frequencies from unknown sources (n=18).

Between 3 and 4 microns, there is a decrease in the frequency of Bodie Hills obsidian and a concomitant increase in Napa Valley and Borax Lake obsidian in the northern Sierra Nevada. Even more interesting is that following this, Bodie Hills obsidian rebounds and steadily increases in frequency, while Borax Lake decreases, and Napa Valley steadily decreases for the remainder of the prehistoric period. This discontinuity at 3-4 microns is provocative. It could be suggested that this represents a population intrusion which disrupted preexisting obsidian exchange relationships for a time, which were then reestablished as the new population settled in. Depending on which hydration rate one uses, this change could coincide with several periods of change or upheaval postulated by Moratto, Kowta and others. But without knowing which hydration rate to believe, we are left with several possible explanations of the data. Still a third explanation is that the discontinuity corresponds with a climatic interval that caused a disruption in the availability of Bodie Hills obsidian (cf. Moratto et al. 1978; Bouey and Basgall 1984). In any event, the discontinuity at 3-4 microns is interesting and with further obsidian work, it may be found to have culture-historical significance.

CONCLUSIONS

In conclusion, this study has attempted to synthesize and analyze the growing body of obsidian data for the northern Sierra Nevada region. As the preceding discussion indicates, we have achieved variable success in using these data to shed new light on the prehistory of this region and in the resolution of pressing regional questions. Some interesting observations can be made based on the obsidian data and there are several areas, primarily involving hydration rates, where additional work is needed if we are to make substantial future use of obsidian data.

Available data indicate that many of the known obsidian sources are not represented in the sites of the region and that, in fact, 7 sources - Bodie Hills, Napa Valley, Mt. Hicks, Borax Lake, Vya, South Warners Group, and East Medicine Lake Group - dominate the obsidian assemblages.

We have found, to our surprise, that the geographical location of sites in the northern Sierra Nevada is a strong factor in determining obsidian source frequencies.

Contrary to earlier beliefs, we have found that there is not an increase in Napa Valley obsidian in the late period at the expense of Bodie Hills. In fact, just the opposite appears to have occurred. Bodie Hills is the most dominant single source in the northern Sierra Nevada. The extensively studied Casa Diablo source, located further south, appears to have a restricted geographical occurrence. Hughes' (1985) analysis of Hidden Cave obsidian found that Casa Diablo obsidian was not being traded east. To that observation we can add that it was not traded to the north much either, since it occurs at only 4 of the 28 sites in our sample.

Bennyhoff et al. (1982) have suggested that a significant north-south exchange system may have prevailed in the eastern Sierra Nevada. Our data support this, but we must add that the northern Sierra region, east of the crest, really marks the interface of 2 exchange systems (Ericson 1977), one bringing southern obsidian (Bodie Hills, Mt. Hicks, etc.) northward, and another system bringing northern obsidian (East Medicine Lake Group, Vya, South Warners Group, etc.) southward (Figure 11).

In the west, the situation is more complex. It appears likely that southern (i.e., Bodie Hills) obsidian was coming over the Sierra Nevada somewhere south of Lake Tahoe, based on its near exclusiveness in the southern group of sites (El Dorado, Amador, Alpine and Calaveras counties) in our study. The western Sierra populations located further north (Placer and Nevada counties) and the Central Valley populations are receiving southern obsidian predominantly from this direction. Southern obsidian is then being traded still further north into western Sierra and Plumas counties. The lack of southern obsidian in eastern Sierra and Plumas counties would seem to preclude that area as a source of the southern obsidian found in the western foothills. We, therefore, believe the data support the existence of an important north-south exchange system operating on the western flank of the northern Sierra Nevada (Figure 11). This is in addition to an east-west system that linked the western foothills with the Sacramento Valley and North Coast Ranges.

There does not appear to be a lot of evidence for a substantial trans-Sierran exchange system in this region. Although some exchange may have occurred via the Donner Pass area, we do not see this as a major source of southern obsidian for the western slopes. Eastern Sierra Nevada obsidian and coastal shell beads (found in Great Basin sites) were more likely being exchanged across the Sierra further south, perhaps through Yosemite, as suggested by Hughes (1985), than through the northern Sierra, based on the data available now. Preliminary information derived from studies in the Stanislaus National Forest (Warren Wulzen, personal communication 1991) suggest that Bodie Hills obsidian found on the western slopes of the Sierra Nevada most likely crossed the mountains somewhere north of the North Fork Stanislaus River. South of this point, Casa Diablo obsidian occurs on the western slopes, but is absent to the north. This suggests that the north-south exchange system we have postulated for the western Sierra Nevada did not extend south of the North Fork Stanislaus, or else it would have picked up Casa Diablo obsidian and carried it further northward.

Clearly, as additional obsidian data become available, we will be in a better position to identify and map the finer details of the exchange networks operating in the Sierra Nevada prehistorically. It is important to remember that (at least for

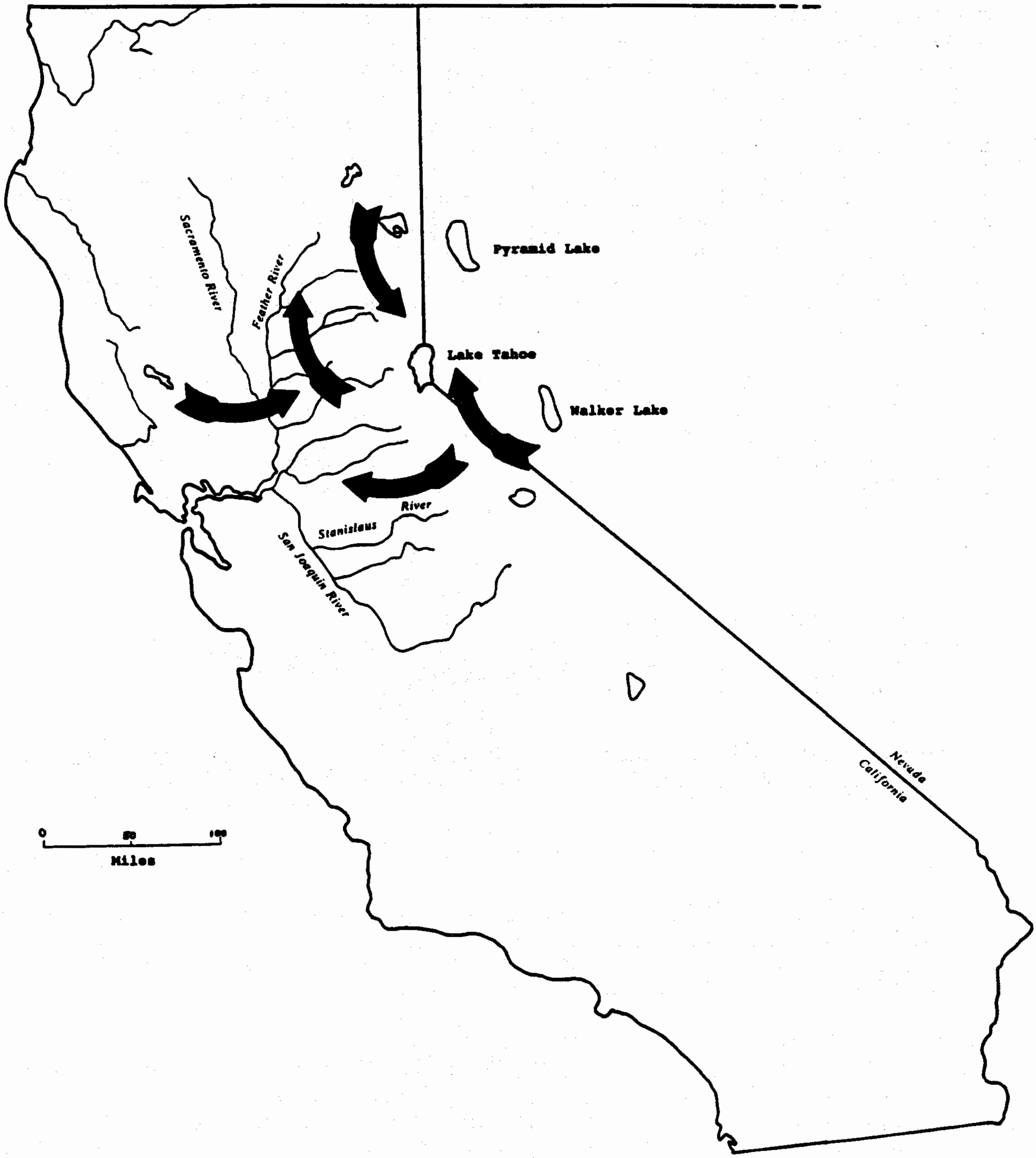

Figure 11. Hypothetical obsidian exchange networks operating in the northern Sierra Nevada.

the northern Sierra Nevada) we are not describing "obsidian" exchange systems but rather exchange systems in which obsidian was just 1 minor item traded between prehistoric populations.

During all time periods in the northern Sierra Nevada, obsidian makes up a relatively small percentage of lithic assemblages. But because obsidian can be traced by virtue of its chemical make up, it is of real importance to archaeologists trying to reconstruct prehistoric exchange systems. Just how important it was to the aboriginal populations is not clear, but based on its frequency of occurrence (particularly north of Lake Tahoe), it does not appear to have been an important commodity for the region's native populations. It still remains possible that obsidian served more non-utilitarian functions, as suggested by Jackson (1986) and Fredrickson (1989) for the North Coast Ranges, and was more important culturally than frequency of occurrence would suggest, but this is something yet to be determined.

Nevertheless, obsidian artifacts and debitage are important elements of northern Sierra Nevada sites, and because of the great potential that obsidian source and hydration analyses offer, we need to insure that we make obsidian studies a key ingredient in northern Sierra Nevada archaeological research.

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